REMARKS/ARGUMENTS

This amendment is in response to the final Official Action mailed on July 10, 2008. Entry of the foregoing, and in favorable reconsideration and reexamination of the application pursuant to and consistent with 37 C.F.R. § 1.112, and in light of the remarks which follow, are respectfully requested.

Claim 5 has been amended, claims 10-15 are new, and claims 6-9 are pending. Support for amended claim 5, and in particular the limitation "excess NH_3", can be found at p.2,ll. 13 and 24 and p.9,ll.2 and 17 of the pending application. Moreover, the limitation in claims 5, 12, and 14 that the NH_3 decomposition process is separate from the denitrification process is supported on p.9,ll.15-20. Support for the NH_3 decomposition catalyst recited in claims 10, 12, and 15 can be found at p.14,ll.11-23 and original claim 4. Support for the limitation of a mercury oxidation catalyst as recited in claims 11, 13, and 14 can be found at p.15,ll.9-23 and in original claim 3. No new matter has been added by way of this amendment.

The Examiner has rejected claims 5-9 under 35 U.S.C. §103(a) as being allegedly unpatentable over *Iida* (United States Patent 6,638,485). The Examiner believes that "*Iida* discloses a method for removing [Mercury from] exhaust gas comprising adding a mercury chlorinating agent and ammonia to exhaust gas to convert the mercury to mercury chloride, passing [the exhaust gas] to a NO_x/ammonia reactor, and passing [the exhaust gas] through a scrubbing tower." *Office Action*, page 3. Moreover, the Examiner believes "[i]t would have been obvious to one or ordinary skill in the art at the time the invention was made to oxidize mercury on the downstream side of ammonia [de]composition because the reaction of mercury chloride and SO_x is disclosed as being at the end of the process..." *Office Action*,

page 3. As the rejection would be applied to the claims as amended, Applicant respectfully disagrees.

Iida does not teach all of the limitations of the claimed invention. ("[T]he prior art reference must teach or suggest all of the claim limitations." MPEP 2143, introductory paragraph). In particular, *Iida* does not teach adding an excess of ammonia or a discrete ammonia decomposition step. Nor does *Iida* teach a separate mercury oxidation step. Each of these deficiencies are addressed below.

Iida teaches a process for treating a mercury-containing exhaust gas. Specifically, *Iida* employs ammonia (NH_3), as a reducing agent, to break-down nitrates (NO, NO_2), contained in exhaust gases, into diatomic nitrogen. *Iida*, col.3,ll.38-41. The background section of *Iida* provides two chemical formulas showing the reactions that take place during reductive denitration, as follows:

$$4NO + 4NH_3 + O_2 \rightarrow 4N_2 + 6H_2O$$

[or]

$$NO + NO_2 + 2NH_3 \rightarrow 2N_2 + 3H_2O$$

Iida, col.1,ll.40-48.

These chemical formulae demonstrate that complete denitrification occurs only when sufficient ammonia (the reactant) is present. Here, the formulae indicate that stoichiometric amounts of ammonia and nitrates are required, i.e. the amount of nitrogen in the nitrates is in a 1:1 ratio with the amount of nitrogen in ammonia. One skilled in the art would recognize that if an excess of any starting material is present before reaction, the amount of that material in excess will remain and be present in combination with the end products. For example, nitrates will remain if less than equimolar amounts of the ammonia reactant are used.

While *Iida* discloses that a similar reductive

denitration process may be utilized[1], *Iida* discloses that less than equimolar amounts of ammonia are used. Specifically, Example 1, which is the only disclosure provided in *Iida* of an amount of ammonia injected into the denitration unit, provides that the "mol ratio of NH_3/NO_x" is 0.9, i.e. for every mol of NO_x, 0.9 mol of NH_3 is injected. Col.5,ll.4-6. It is clear from this teaching that *Iida* is not injecting enough ammonia to completely reduce all nitrates present in an exhaust gas. Therefore, one skilled in the art would recognize that *Iida* teaches incomplete reductive denitration, and that nitrates remain in any exhaust gas flowing downstream.

The claimed invention, in contrast to the teachings of *Iida*, claims the use of an excess of ammonia, i.e. greater than equimolar amounts of ammonia as compared with nitrates. The claimed invention also employs a discrete ammonia decomposition process, which is downstream and separate from any denitrification process. This ammonia decomposition process is used to break-down the excess ammonia in the exhaust gas prior to subsequent processing steps, i.e. prior to mercury oxidation and wet desulfurization. *Iida* does not disclose any ammonia decomposition step, or suggest that such a step would be operable, yet alone effective, if combined with further reactive processes.

While the examiner believes that *Iida* discloses ammonia decomposition, by way of the chemical formulae recited in the background section, this disclosure merely shows, chemically, how ammonia reacts with nitrates. Indeed, when read in context, these formulae are not demonstrating a process in which ammonia, if used in the proper amounts, is decomposed, only that ammonia is consumed to achieve proper reduction of the nitrates.

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[1] In some embodiments, *Iida* even discloses that no NH_3 is used, thereby leaving all nitrates free to flow downstream. Col.4,ll.44-51.

Moreover, *Iida* teaches the simultaneous reduction of nitrates and oxidation of mercury. According to the process of *Iida*, "NO_x in the exhaust gas[,] into which ammonia and HCl are injected[,] reacts with the ammonia [to form N_2,] and metal Hg is oxidized to $HgCl_2$ in the presence of HCl in the 'reduction denitrating unit' at the same time." Col.4, ll.20-28, emphasis added. In fact, it appears that the goal of *Iida* was to convert mercury to mercury chloride over a denitrating catalyst. Col.3,ll.1-5.

> Specifically, the present invention relates to a method and equipment in which metal mercury is converted into a largely water-soluble chloride on a denitrating catalyst by adding a mercury chlorinating agent such as HCl or the like to the exhaust gas containing the mercury in the upper stream side of the reduction denitrating reaction unit…

Col.3,ll.19-27. There is no disclosure in *Iida* that these reduction and oxidation steps could be separated or that it would be desirable to do so.

In contrast, the claimed invention employs separate reductive denitration and mercury oxidation steps. In fact, these steps are separated by the aforementioned ammonia decomposition step. Accordingly, *Iida* does not teach all of steps of the claimed invention, and therefore cannot render the claimed invention obvious. Accordingly, the rejection should be withdrawn.

Nor does *Iida* disclose any catalyst which may be used as part of a discreet ammonia decomposition process as in new claims 10, 12, and 15. Accordingly, claims 10, 12, and 15 are believed to be novel and not obvious over the claimed invention.

Finally, because *Iida* teaches simultaneous reduction and oxidation, one skilled in the art would not have been motivated to oxidize mercury on the downstream side of ammonia

decomposition, as suggested by the Patent Office. Accordingly, the claimed invention and *Iida* teach two different processes of treating exhaust gases. As such, the rejection should be withdrawn.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue.

If, however, for any reason the Examiner does not believe that such action can be taken at this time, it is respectfully requested that he/she telephone applicant's attorney at (908) 654-5000 in order to overcome any additional objections which he might have.

If there are any additional charges in connection with this requested amendment, the Examiner is authorized to charge Deposit Account No. 12-1095 therefor.

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Respectfully submitted,

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